

Amendment and Response

Applicant: Werner Hemmert

Serial No.: 10/527,938

Filed: November 14, 2005

Docket No.: I432.118.101/P30059

Title: CIRCUIT ARRANGEMENT AND SIGNAL PROCESSING DEVICE

REMARKS

The following remarks are made in response to the Non-Final Office Action mailed August 4, 2009. Claims 31-39 have been allowed. Claims 22, 27, 29, 40, and 43 were rejected. Claims 23-26, 28, 30, 41, and 42 have been objected to. With this Response, claims 22, 31, 36, 40, and 43 have been amended. Claims 22-43 remain pending in the application and are presented for reconsideration and allowance.

Specification

The Examiner objected to the disclosure for informalities.

Applicant submits that the substitute specification filed on November 14, 2005 includes the proper headings and any “WO 2004... and PCT/DE...” headings have been removed. Accordingly, Applicant submits that the above objection to the disclosure should be withdrawn.

Claim Rejections under 35 U.S.C. § 102

The Examiner rejected claims 22, 27, 29, 40, and 43 under 35 U.S.C. § 102(e) as being anticipated by Nieri et al., U.S. Patent No. 6,838,951 (“Nieri”).

Applicant submits that Nieri fails to teach or suggest the limitations recited by independent claim 22 including **a control circuit for open-loop or closed-loop control of a quality factor of the resonator circuit, the control circuit being configured to control the quality factor of the resonator circuit depending on a signal profile of the signal amplitude of the input signal and/or of the output signal.**

In rejecting claim 22, the Examiner relies on column 10, first paragraph, of Nieri as disclosing each and every element of claim 22. The rejection, however, is based on a mischaracterization of the Nieri reference, which in fact does not disclose each and every element of claim 22.

The Examiner states, “This [(Nieri at column 10, first paragraph)] shows that to maintain a desired amplitude level [of a voltage controlled oscillator], control of the quality factor of the resonator tank is implemented by way of the coarse tune circuit.” (Office Action, page 3). As

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will be explained below, what Nieri in fact discloses is that changing the quality factor of the resonator tank (in this case a capacitance value of an LC circuit) **causes** undesirable variations in amplitude level of a voltage controlled oscillator (VCO). In order to maintain a desired amplitude level, Nieri discloses that the VCO bias current circuit provides a compensating bias current based on various tuning parameters available within a frequency synthesizer.

What the coarse tuning circuitry of Nieri in fact does is “effectively calibrate the frequency range of the VCO 18 for improved fractional-N performance.” (Col. 3, lines 62-63). The coarse tuning circuitry adjusts the VCO's resonant tank circuit capacitance value (i.e., its Q factor is adjusted) based on a comparison of the time periods of an average VCO signal and average reference signal. (Col. 4, lines 1-12).

Nieri further explains that changing the quality factor of the resonator tank causes undesirable variations in amplitude level of a VCO. In order to maintain a desired amplitude level, the VCO bias current circuit provides a compensating bias current based on various tuning parameters available within a frequency synthesizer:

Since the amount of capacitance loading the tank circuit 58 will vary significantly from the binary setting of 000 to the binary setting of 111, the oscillator output voltage will also vary significantly. This is due to the change in the Q of the resonant tank circuit 58. As illustrated in FIG. 4, the quality factor Q is at a maximum when VTC_{SEL} is 000 and a minimum when VTC_{SEL} is 111. Varying the quality factor Q will also affect the single sideband phase noise (SSBN) associated with the output of the VCO 18, which is often a design parameter for the VCO 18 when used in transceiver applications....

...it can be readily seen that if the total signal power (P_s) of the VCO 18 increases then the single sideband phase noise of the VCO 18 will decrease. Since the coarse tuning capacitance changes from coarse tuning step 000 to step 111, the resonant tank quality factor Q also changes. ***Therefore, the change in quality factor Q can be offset by changing the total signal power of the VCO 18.***

The VCO bias circuit 54 of the present invention adjusts the VCO bias current 56, thereby changing the total signal power (P_s), as the VCO 18 is tuned by the coarse tuning circuitry 14 to compensate for the changing quality factor Q caused by varying the total capacitance of the tank circuit 58 of the VCO 18. This compensation can be done to keep the VCO single sideband phase noise relatively constant over the coarse tuning steps. In addition or alternatively, the compensation can be done to keep the output voltage relatively constant over the coarse tuning steps. (Col. 5, line 51 – col. 6, line 21 (emphases added)).

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Thus, the Examiner is incorrect in asserting that “to maintain a desired amplitude level [in the Nieri circuit], control of the quality factor of the resonator tank is implemented by way of the coarse tune circuit,” because 1) the coarse tune circuit in fact effectively calibrates the frequency range of the VCO for improved fractional-N performance and 2) it is the VCO bias circuit that maintains the desired amplitude level.

As explained in the above description and seen in the circuit of Figure 1 of Nieri, the characterized control circuit of Nieri adjusts the VCO's resonant tank circuit capacitance value (i.e., its Q factor is adjusted) based on a comparison of the time periods of an average VCO signal and average reference signal. (Col. 4, lines 1-12). Adjusting a Q factor based on a comparison of the time periods of two signals does not disclose a control circuit being configured to control the quality factor of the resonator circuit depending on a signal profile of the signal amplitude of the input signal and/or of the output signal as required by claim 22.

In view of the above, Applicant submits that the above rejection of independent claim 22 under 35 U.S.C. § 102(e) should be withdrawn. Dependent claims 27 and 29 further define patentably distinct independent claim 22. Accordingly, Applicant believes that these dependent claims are also allowable over the cited reference. Allowance of claims 22, 27, and 29 is respectfully requested.

For similar reasons as discussed above with reference to independent claim 22, Applicant submits that Nieri also fails to teach or suggest the limitations recited by independent claim 40 including **a control circuit for open-loop or closed-loop control of a quality factor of the resonator circuit, the control circuit being configured to control the quality factor of the resonator circuit depending on a signal profile of the signal amplitude of the input signal and/or of the output signal**; and the limitations recited by independent claim 43 including **means for providing a control circuit for open-loop or closed-loop control of a quality factor of the resonator circuit, the control circuit being configured to control the quality factor of the resonator circuit depending on a signal profile of the signal amplitude of the input signal and/or of the output signal**.

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In view of the above, Applicant submits that the above rejection of independent claims 40 and 43 under 35 U.S.C. § 102(e) should be withdrawn. Allowance of claims 40 and 43 is respectfully requested.

Allowable Subject Matter

The Examiner allowed claims 31-39.

The Examiner objected to claims 23-26, 28, 30, 41, and 42 for being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all limitations of the base claim and any intervening claims.

Dependent claims 23-26, 28, 30, 41, and 42 further define patentably distinct independent claim 22 or 40. Accordingly, Applicant believes that these dependent claims are also allowable over the cited reference. Allowance of claims 23-26, 28, 30, 41, and 42 is respectfully requested.

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CONCLUSION

In view of the above, Applicant respectfully submits that pending claims 22-43 are in form for allowance and are not taught or suggested by the cited references. Therefore, reconsideration and withdrawal of the rejections and allowance of claims 22-43 is respectfully requested.

No fees are required under 37 C.F.R. 1.16(h)(i). However, if such fees are required, the Patent Office is hereby authorized to charge Deposit Account No. 50-0471.

The Examiner is invited to contact the Applicant's representative at the below-listed telephone numbers to facilitate prosecution of this application.

Any inquiry regarding this Amendment and Response should be directed to Steven E. Dicke at Telephone No. (612) 573-2002, Facsimile No. (612) 573-2005. In addition, all correspondence should continue to be directed to the following address:

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Respectfully submitted,

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SED:mlm

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